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IMPROVEMENT IN A PRACTICE EXPERIMENT UNDER SCHOOL CONDITIONS

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The importance of knowledge concerning the amount and rate of improvement due to practice under school conditions and concerning the effect of equal amounts of training upon the individual differences found amongst a given group in a given trait is so great that we venture to report a very slight contribution to it.

The experiment consisted in measuring the effect of approximately sixty minutes' practice (in approximately 30 periods of 2 minutes each, given twice daily for the five school days of the week) at adding columns, each of ten digits (o and I not being used). The subjects were twenty-nine boys in a fourth-grade class in New York City.

The score used as a measure of efficiency was the number of examples done correctly. That is, no credit was given for an example containing any error. We are unable to report how much interest

in the work and in improvement there was.

The group as a whole improved, as the result of the hour's practice, from an average score of 2% examples correctly done per minute in the first two periods, to a score of $4\frac{1}{2}$ examples done correctly per minute in the last period. The results thus emphasize the very great gain probably to be expected from applying the method of the practice experiment to certain functions whose improvement is a part of the school curriculum. The individual amounts of improvement are shown in Table I.

If we compare the improvement of the eight boys who showed the least ability at the start (4, 4, 5, 6, 7, 7, 8 and 8 examples done correctly in four minutes) with the seven who showed the most ability at the start (21, 19, 16, 16, 15, 14 and 14 examples done correctly in four minutes,) we find that the latter made equal or greater gross gains (8 on the average to 7.6 for the less able group). What happens when individuals of different abilities are given equal practice in addition is shown still more clearly by Table I, which gives the average scores for: First, the four boys of initial ability 4, 5 or 6; Second, the four boys of initial ability 9; fourth, for the seven boys of initial ability 19; fourth, for the seven boys of initial ability 13; sixth, for the five boys of initial ability 14, 15 or 16; seventh, for the two boys of initial ability 19 and 21.

These results, showing so little power of equal additions to training to reduce individual differences, make it improbable that a very large fraction of the differences found among school children can be justly attributed to differences in amount of training. Since the argument on this point has been stated by Thorndike (Amer. Jour. Psychol., xix, 1908, 383 f.), and by Wells (Amer. Jour. Psychol., xxiii, 1912, 75-88), we will say no more about it. The results of the present study are in entire accord with the view presented by these

authors.

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Fourth-Grade Pupils	Gross gain,— First two to Last two	0 7 0 8 ry	15 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	10	1001	
	Sixteenth two	111 114	11 15 22	17.5	91 9	(app.)
	owi dinəəilif	10 10 13	19 10 18 18	15.8	17 9 16 21	15.8
	Pourteenth two	21 9 16	20 II I4 I6	15.3	16 11 13 21	15.3
	owt dtneetidT	4 6 6 7 8 7 3	15 14 23	15.3	11 7 14 21	13.3
	Twelfth two	6 6 112 8.3	21 7 14 16	14.5	14 6 15 17	13
TH-G	Eleventh two	9 11 5 13 9.5	19 9 14 20	15.5	13 9 15	13.5
Successive Scores in Addition: Four	Owt dinsT	13 8 14 14 9.8	17 10 12 20	14.8	11 7 13 18	12.3
	owt dtniN	8 6 17 8.5	21 5 10 16	13	8 6 11 19	II
	Eighth two	4 6 8 8 8	16 10 13 14	13.3	98 112 15	II
	Seventh two	9 8 9 7.8	13 10 12 11	11.5	10 10 10 10	12.3
	Sixth two	9 8 4 11	19 9 12 16	14	10 7 10 12	9.8
	Fifth two	10 5 4 7 6.5	16 7 13 11	8.11	9 8 12 15	II
	Fourth two	8 9 12 12 8.5	16 8 13 15	13	12 12 14	11.8
	owt bridT	5 5 10 6.8	15 6 13 10	II	8 4 12 13	9.3
	Second two	6 6 8.8	13 7 10 10	10	6 8 10 14	9.5
	Owt teria	4 4 5 0 4 8.4	7 7 8 8	7.5	0000	0
	Number of periods practiced	25 31 32 32 for x, y,	32 31 32 32 607 S B	· :	31 32 29 32 for e. k	
	Indi- vidual	x y r f Average for r and f	s B m v Average for	m and v	e 31 k 32 n 29 A 32 Average for e.	n and

TABLE I-Continued

Gross gain,— First two to Last two	0 ww u v w 4	9.9	0 12 13	8.3	2 2 I I I O I	6.8	15	II
Sixteenth two	19 13 18 18 16	17.4 (app.)	13 25 26	21.3	35	ر	36	c-
Pifteenth two	13 18 10 12 22 11	14.7 (app.)	15 23 25	21	20 16 16 34 26	22.4	30	<i>د</i> .
Fourteenth two	20 12 18 14 14 17 10	15.6	15 27 17	19.7	22 10 15 31	20.6	26	27
Owt dtneetit	17 14 16 19 11 11 11	14.9	14 21 20	18.3	114 125 125 136	19.6	38 8 8 8	30
Twelfth two	12 14 19 19 11 11 11	15.4	13 20 20	17.7	19 12 29 23	19.4	32	301/2
Eleventh two	19 14 13 12 15 16	14.4	14 20 16	16.7	15 9 14 32 15	11	31	201/2
Tenth two	19 15 15 12 16 18	15.1	9 19 19	15.7	16 12 13 28 21	18	29	27
owt AtniN	18 11 10 17 14 18	14.7	10 20 15	15	16 7 17 28 22	18	27	261/2
Eighth two	114 112 124 14 9	12.6	15 18 21	18	13 12 11 26 21	16.6	26 31	281/2
Seventh two	16 18 15 15 15 13	14.9	11 19 19	16.3	17 16 12 25 25	18.8	2 2 5	231/2
owt dtxi2	13 17 15 14 11 21	14.7	16 16 13	15	112 113 23 23	17.6	24	251/2
owt Atlif	10 11 12 11 10 17	12	14 14 17	15	14 12 16 23 24	17.8	21	24
Fourth two	15 13 17 17 18 18	14	13 17 13	14.3	16 12 18 25 24	19	23	25
owt bridT	16 12 12 16 11 11 15	13.7	10 16 18	14.7	16 10 15 18 19	15.6	20	241/2
Second two	111 121 133 141 141	12.4	01 01 11	10.3	12 13 15 15	13	2 I 2 4	221/2
owt triff	10 10 11 11 12 12	11.1	13 13 13	13	14 14 15 16	15	19	20
Number of periods practiced	27 30 31 31 31 32 32 32	j and o	32 32 32 for t, u	· · · · · · · · · · · · · · · · · · ·	3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		28 32 of 937d	a :
Indi- viduals	W W V	i, C, c,	t u z Average	and	ಜ ಎರ್ ದಂ *	Average for p, h and o	g 1 Average	1